



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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CRUISE REPORT¹

VESSEL: *Oscar Elton Sette*, Cruise OES-06-03 (OES-39)

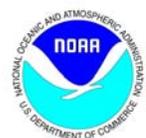
CRUISE PERIOD: March 5-28, 2006

AREA OF OPERATION: American Samoa, Equatorial Central Pacific, and Johnston Atoll

TYPE OF OPERATION: The NOAA ship *Oscar Elton Sette* was engaged as support for a Pacific Islands Fisheries Science Center (PIFSC), National Marine Fisheries Service (NMFS), NOAA, project from March 5 to March 28, 2006 for a total of 23 sea days conducting cetacean surveys at/in the waters of American Samoa, the equatorial central Pacific, Johnston Atoll, and surrounding areas.

ITINERARY:

- March 5 Embarked Scientists Johnston, Hakala, Rankin, Hazen, Conger, Maguire, Finn, Musyl, and Landgren. Departed Pago Pago at 1000.
- March 5–7 Conducted visual, acoustic and oceanographic observation operations in offshore waters of Tutuila, Manua Islands, and Rose Atoll.
- March 8 Conducted visual, acoustic and oceanographic observation operations on transit to Swains Island.
- March 9 Conducted visual, acoustic and oceanographic observation operations in waters around Swains Island.
- March 10–18 Conducted visual, acoustic and oceanographic observation operations on transit to Johnston Atoll.



¹ PIFSC Cruise Report CR-06-019
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March 19–24 Conducted visual, acoustic and oceanographic observation operations and longline operations in the exclusive economic zone (EEZ) of Johnston Atoll.

March 24–28 Continued operations on transit to Honolulu. Arrived Honolulu 0900, disembarked scientists.

MISSIONS AND RESULTS:

- A. The scientific objectives of the cruise were to: (1) collect line-transect data on cetacean abundance and distribution for all cetacean species present in the study area mentioned above, (2) collect biopsy samples for genetic studies of population structure of cetaceans, (3) collect photo-ID data on cetaceans for population structure and abundance, (4) collect passive acoustics data (recordings and detections) on cetacean vocalizations to assess species presence and distribution, (5) collect fisheries acoustic data to assess changes in the relative abundance and distribution of potential prey species for cetaceans in the study area and to illustrate how changes in the deep scattering layer change over large scales (across the equatorial Pacific from American Samoa to Johnston Atoll), and (6) collect physical and biological oceanographic data to provide an ecological context for observations mentioned above.
1. **Line-transect Surveys.** Line transect surveys were conducted during daylight hours each day of the cruise except March 27 and March 28 because of poor weather and adverse sighting conditions. These efforts resulted in 37 sightings of cetacean groups, 29 of which were on effort sightings. Nine species were detected visually and the following are the numbers of groups sighted: minke whales ($n = 2$), sperm whales ($n = 3$), killer whales, ($n = 1$), short-finned pilot whales ($n = 3$), false killer whales ($n = 7$), Risso's dolphins ($n = 1$), rough-toothed dolphins ($n = 1$), spotted dolphins ($n = 6$), spinner dolphins ($n = 3$). On five occasions, mixed groups of cetaceans were detected. Also, twelve groups of unidentified dolphins were detected. Locations of cetacean visual detections are presented in Figure 1.
 2. **Biopsy Sampling.** Three small boat excursions for the collection of biopsy samples were conducted during the cruise. The first deployment was on a group of pilot whales detected during the equatorial crossing, and three biopies were collected. The second excursion in the nearshore waters of Johnston Atoll produced no dolphin sightings and no biopsies. The final small boat deployment occurred on minke whales detected in the neashore waters of Johnston Atoll, and no biopsies were collected.
 3. **Photo-identification Sampling.** Approximately 2,200 photos of cetaceans were collected on the cruise, representing almost 6.5 gigabytes of photo data.
 4. **Passive Acoustic Surveys.** Cetaceans were detected acoustically with the towed array and sonobouys during each day of the cruise except for the first 2 days because of noise problems with the array. A total of 65 acoustic cetacean detections were obtained, several of which led to chases of groups of cetaceans

not detected visually. Sonobouy recordings of minke whale vocalizations were obtained in the EEZ waters of Johnston Atoll. Locations of acoustic detections along the trackline are presented in Figure 1.

5. Active Fisheries Acoustic Sampling. Fisheries acoustic data were collected constantly during the cruise, producing 15 gb of data for further analysis. These data are currently being analyzed by Elliott Hazen, Ph.D. candidate at the Duke University Marine Laboratory. A plot of backscatter from the 38 kHz transducer along the trackline is presented in Figure 2.
 6. Oceanographic Sampling. Conductivity-temperature-depth (CTD) probe casts were conducted twice daily (0500 and 1830) and expendable bathythermograph probes were launched three times daily (0930, 1200, and 1500). CTD casts did not include bottle sampling. The acoustic Doppler current profiler (ADCP) was operated constantly during the cruise. Plots of selected oceanographic properties (plotted latitudinally) are presented in Figure 3. Meridional and zonal current velocities (plotted latitudinally) are presented in Figure 4. A plan view of current velocity and direction (125-175 m average) is presented in Figure 5.
- B. A secondary objective was to conduct longline fishing operations near Johnston Atoll for tagging and fish physiology studies.
1. In mid-March 2006, two longline fishing sets were deployed around Johnston Atoll (ca. lat. 15°20' N, long. 169° 40' W). The purpose of these two deployments were to collect samples of escolar *Lepidocybium flavobrunneum* for genetic and physiological (visual) studies and to attach pop-up satellite archival tags (PSATs) to blue marlin, *Makaira mazara*, to examine migration patterns. Additional fish and tissue samples were collected for ongoing physiological studies (i.e., cardiac function studies examining temperature tolerances in tuna and mahi mahi) to assay levels of mercury in pelagic fish tissue and to conduct the continuing age/growth studies (i.e., marlins and snake mackerels).
 2. On March 18, 2006, approximately 570 hooks (circle 18/0) were deployed (12 sec. between droppers=gangions and 12 droppers formed a “basket”). In other words, there were 12 baited (sanma, *Cololabis saira*) droppers (ca. 6 fathoms long made of 450# monofilament with a 12-in stainless steel leader terminating with the circle hook) clipped to the mainline (made of ca. 1200# monofilament) between successive floats (floatlines ca. 10 m. polypropylene). As indicated by attached time-depth recorders, this arrangement of hooks was placed between floats “fished” at desired depths (ca. 40 to 80 m). Deployment started at 1900, and operations were finished by 2100. Haul back of the line commenced at 0800 on March 19, 2006, and operations were finished around 1100. Seven mahi mahi (*Coryphaena hippurus*), two bigeye tuna (*Thunnus obesus*), one blue marlin (tagged with PSAT 6886) (*M. mazara*), three swordfish (*Xiphias gladius*), and three escolar (*L. flavobrunneum*) were captured. The PSAT tag on blue marlin is especially noteworthy because no tag information exists in this area for blue

marlin, and PSAT-tagged blue marlin in and around Kona, Hawaii (about 40 tags, some at-liberty for 8 months) did not traverse past 165°W.

3. On March 19, 2006, at 1900, 620 hooks were deployed (same operations as above except with 10 hooks between floats) and operations ceased at ca. 2130. Haul back commenced at 0800 on March 20, 2006, and researchers collected one yellowfin tuna (*Thunnus albacares*), one escolar, two blue shark (*Prionace glauca*), two short-billed spearfish (*Tetrapturus angustirostris*), two silky sharks (*Carcharhinus falfiformes*), three mahi mahi (*Coryphaena hippurus*), one ono (*Acanthocybium solandri*), and one bigeye tuna (*Thunnus obesus*). Sharks were released alive.

**SCIENTIFIC
PERSONNEL:**

Dave Johnston, Ph.D., Joint Institute for Marine and Atmospheric Research (JIMAR),
University of Hawaii (UH)
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Lisa Conger, Contractor, New England Aquarium
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(/s/Dave Johnston)

Submitted by: _____
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Approved by: _____
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Attachments

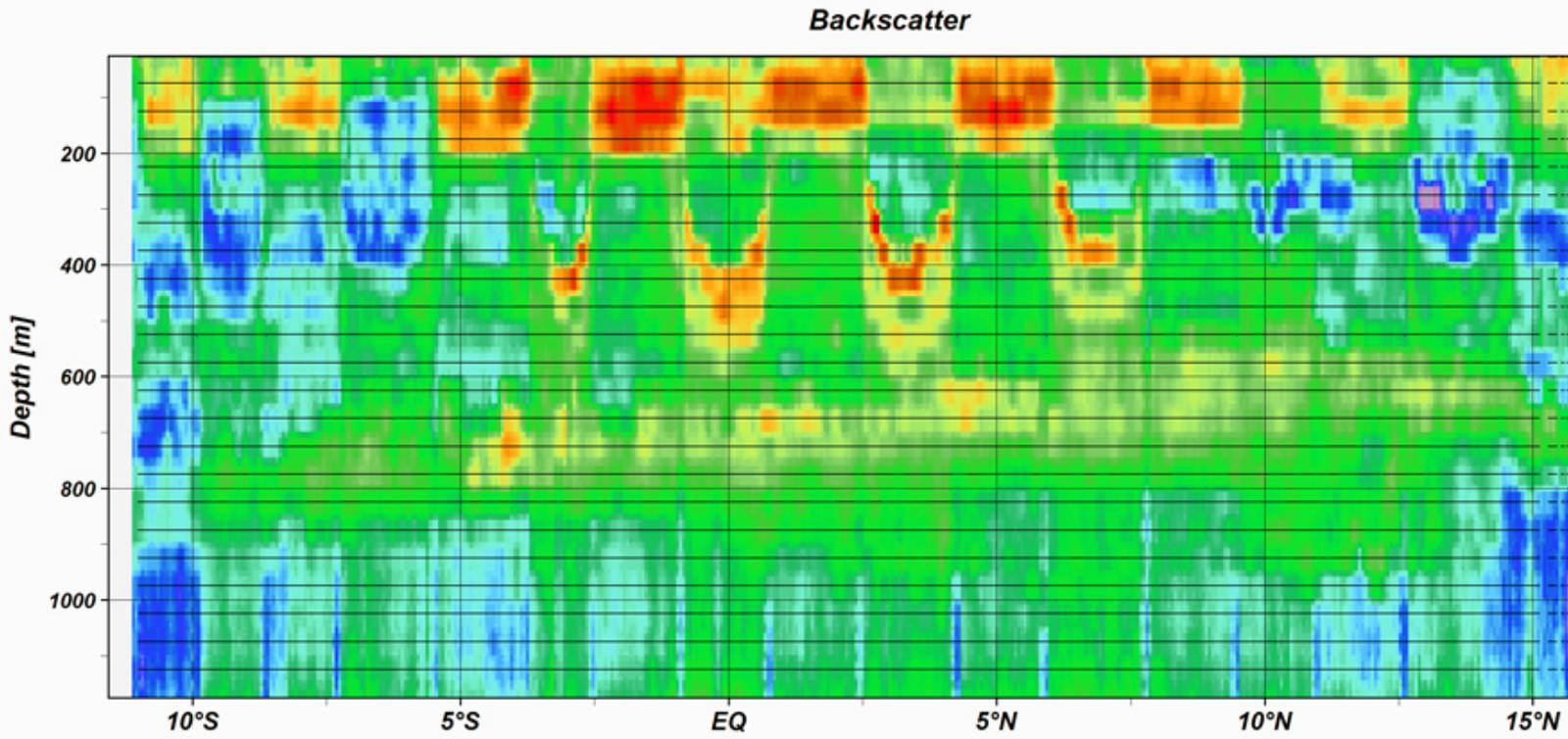


Figure 2. Latitudinal plot of integrated backscatter (38 kHz) along the trackline during OES-06-03. Data are integrated vertically across 23 depth bins and horizontally by 10 pings every 15 minutes.

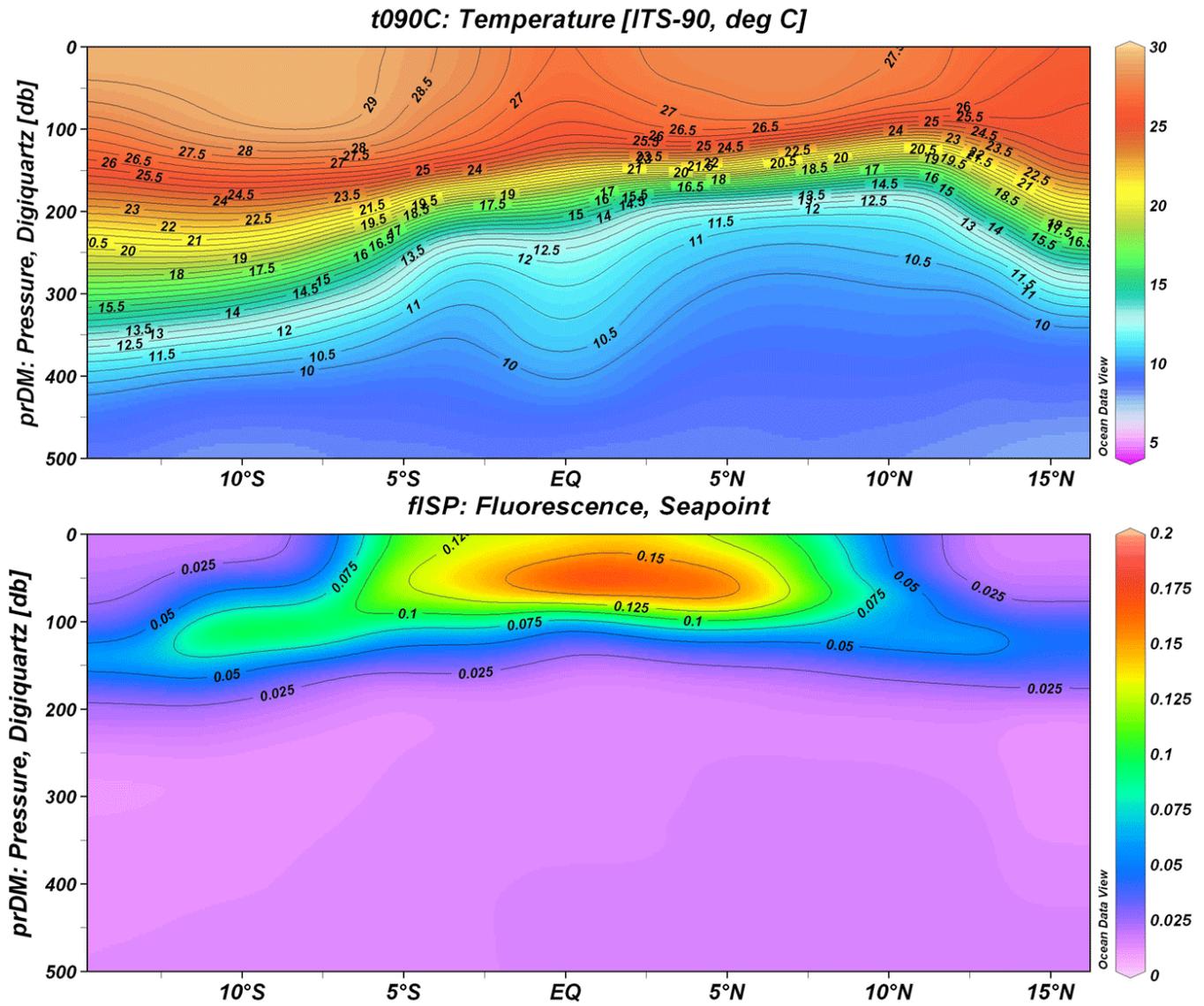


Figure 3. Latitudinal plot of temperature and fluorescence profiles generated from CTD casts and XBT drops during OES-06-03.

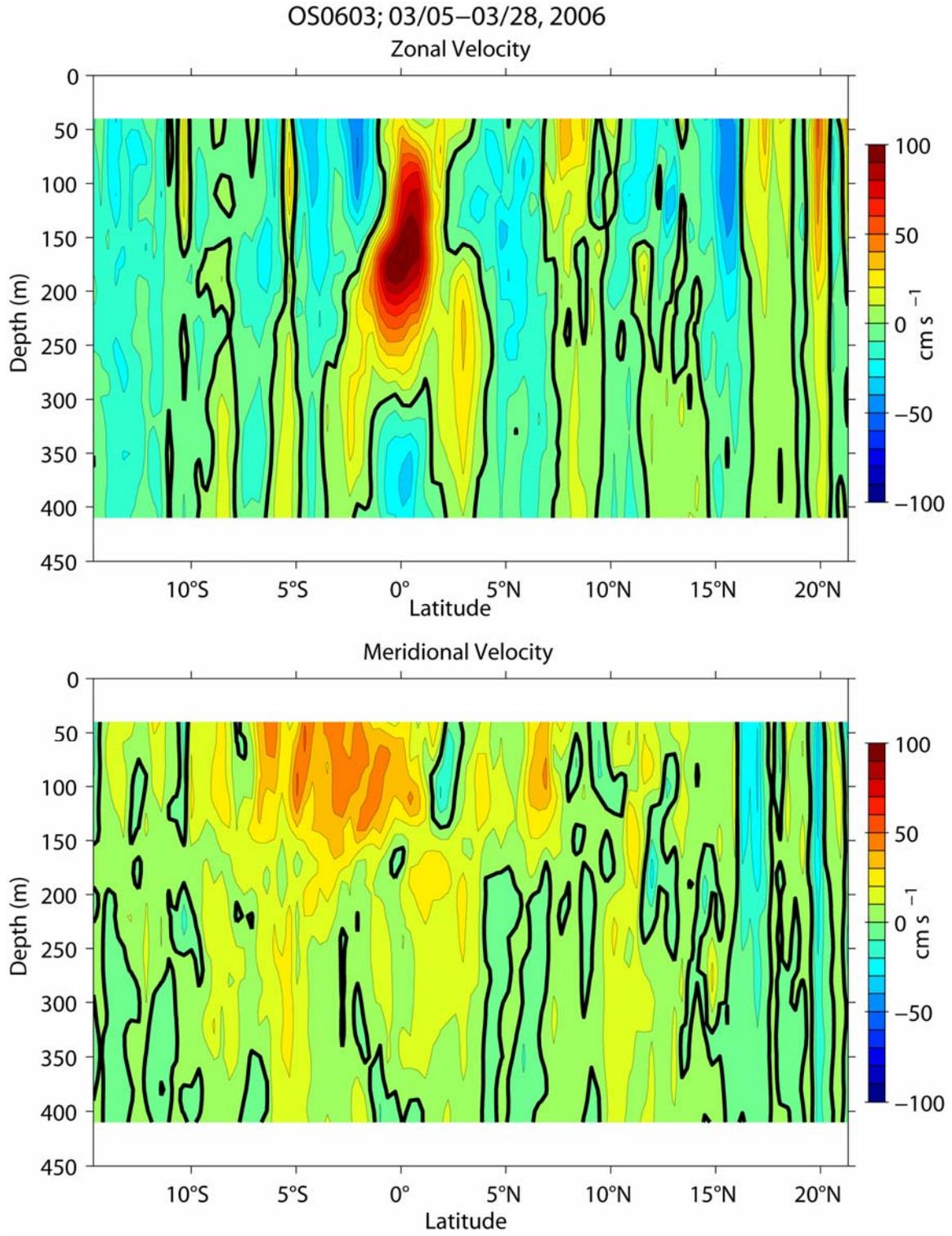


Figure 4. Latitudinal zonal and meridional velocities of ocean currents measured during OES-06-03.

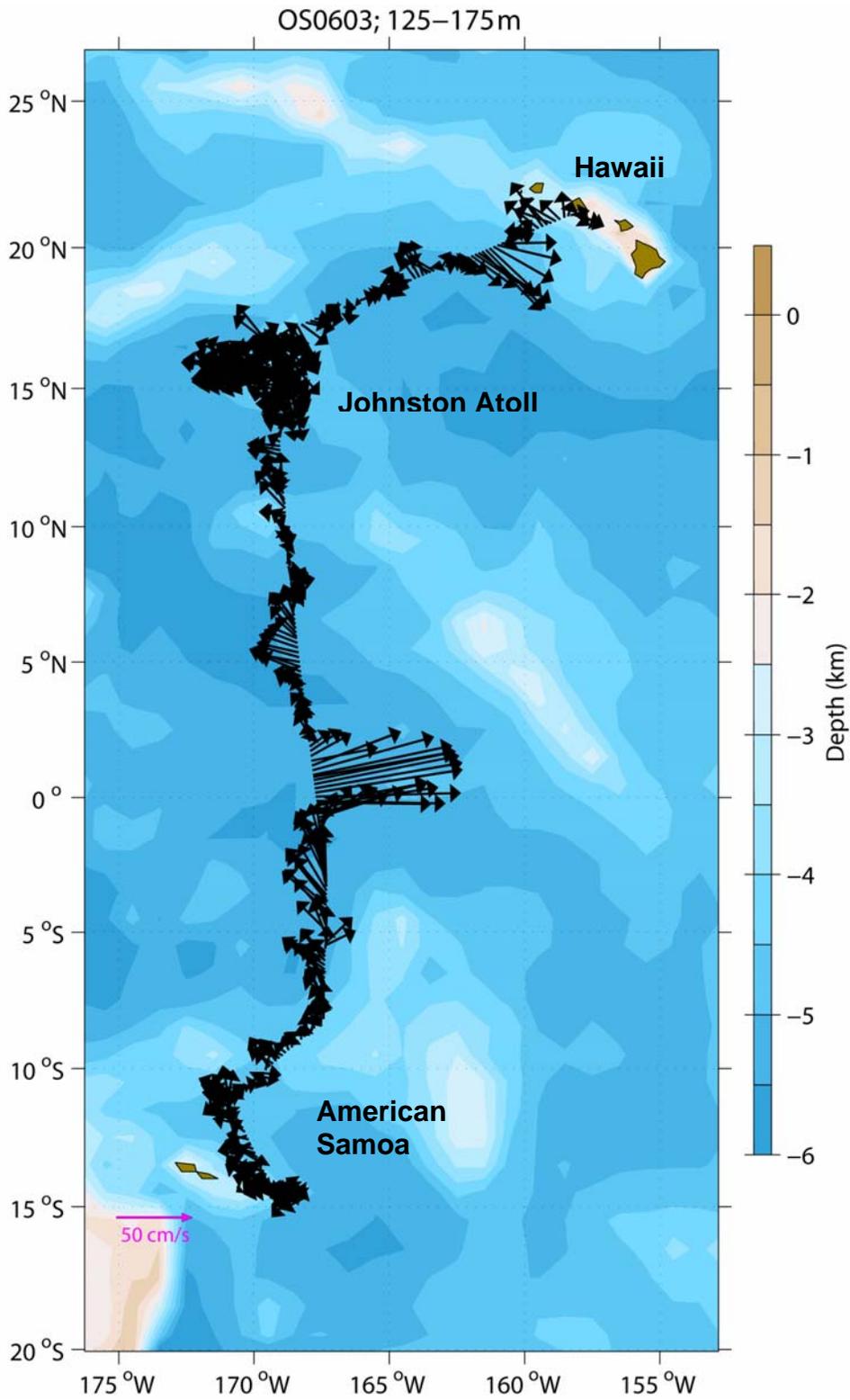


Figure 5. Plan view of average direction and velocity of ocean currents at 125-175m depth measured during OES-06-03.